

rest from eight to nine a. m. In going to rest in darkness the snails did not show preference for any side of the jar but were scattered about. In darkness snails become geotropic and went down to search about as if for food.

Thus change from darkness to light is not necessary to rouse the snails from rest to activity in the early morning hours but some internal factors seem involved. Did changes in temperature and consequently in saturation of moisture of air bring about matinal resumption of activity? In room constantly open by three windows temperatures changed with those outside, following them, not attaining as high maximum nor as low minimum. Snails aroused when temperatures were rising but they went to rest when temperatures were still rising and remained at rest when temperatures dropped in the evening. Moreover, the time of rousing was not that of lowest temperatures and most saturation. And in the closed carton the moisture conditions probably varied little. May not innate habits of feeding and resting and metabolic rhythms activate rather independent of outside stimuli?

The snails matinal arousing followed the songs of several wild birds welcoming the day. While Allard<sup>1</sup> shows such songs to be responses to the sun about to rise yet he concedes that the actual awakening of these birds takes place before the first morning song. This awakening may be compared with that of the above snails and both referred to the culmination of metabolic rhythms started long prior to the light of today.

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## AN OVERLOOKED ARCA FROM SOUTHERN CALIFORNIA

BY A. M. STRONG

Dr. Bartsch in the Proc. U. S. National Museum, Vol. 80, Art. 9, p. 2, which has just been received, describes a new species of *Acar* from Southern California, under the name of

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<sup>1</sup> Allard, H. A. The first morning song of some birds of Washington, D. C. and its relation to light. American Naturalist LXIV, 1930.

*Acar bailyi* and takes as type a specimen collected by me. The history of this species is of considerable interest. Some years ago the late C. E. White and myself, while collecting along the coast between Balboa and Laguna, found a colony of small *Arcas* growing attached to the under side of loose rock partially buried in sandy mud. A few specimens were sent to Dr. Dall for identification which were returned in two lots, one marked young of *A. solida* Sowerby and the other the young of *A. reticulata* Gmelin. As this colony contained specimens in all stages of growth and with much variation in shape it did not seem possible that they could be the young of two species. A much larger set showing the variations was returned to Dr. Dall with the request that he look them over again. He replied that after comparing them with specimens in the Museum from further south he was inclined to think that they represented sexual forms of a dwarf variety of *Arca solida* occurring at the northern limits of the range of the species. As Dr. Dall considered that *Arca gradata* Broderip & Sowerby of the Pacific was the same as *Arca reticulata* Gmelin of the West Indies (Trans. Wagner Inst., vol. 3, pt. 4, p. 629) this probably explains why Dr. Bartsch found the California shells under the different names. After the discovery of the habitat of this species, other colonies were located at various places between Laguna and San Diego and the shells have been distributed under the name of *Arca solida* Sowerby.

Unfortunately there seems to be an older name than that given by Dr. Bartsch for the California shell. Carpenter in the Proc. Zool. Soc., 1856, p. 202, described *Byssarca pernoides* of which the type was a single valve from San Diego. This name seems to have been entirely overlooked in the California records. A free translation of Carpenter's description is as follows: "Shell subquadrate, small, white, covered with a brown spongy epidermis; with fine, very close, minutely tuberculate, radiating striae; umbos obtuse, situated anteriorly, cardinal areas small; within a much curved line of teeth, end teeth strong, nearer the center smaller, crowded, squarish; muscle scars rounded, polished,

portion included within the pallial line radiately striated; margins plain; ligamental grooves small, squarish, situated close together, not toothed, areas almost touching. Long. .68, lat. .53, alt. .32. Hab. San Diego (Dr. Wood). One valve in the Gould collection." To this Carpenter adds the note in English, "Somewhat resembling the fine variety of *B. solida* but squarer and known at once by the teeth and ligament. This is (under the glass) in minute pits, as in *Isognomon* but with an extra layer covering the whole area."

This description fits the shell in question and although the type is not available for comparison, the fact that there is but one species of *Acar* known from this locality makes it almost certain that it represents this species. If this California shell is to be considered as a distinct species (and the difference in size, sculpture and habitat makes this seem reasonable), it is fairly certain that all California records of *A. solida*, *A. gradata* and *A. reticulata* have been based on specimens which should take Carpenter's name *A. pernoides*. The older names should be restricted to a more southern fauna and stricken from the California lists.

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## STUDIES ON SNAILS OF THE GENUS PLEUROCERA I. THE EGGS AND EGG LAYING HABITS

BY HARLEY J. VAN CLEAVE

Until very recently, the life histories of members of the peculiarly American family of snails, the Pleuroceridae, have been almost wholly unknown. Mrs. Jewell, working in the writer's laboratory, discovered the eggs of *Goniobasis* and has described the eggs and newly hatched young in THE NAUTILUS (Vol. 44, pp. 115-119), but the eggs of *Pleurocera* have never been recorded or described in the literature. For several years the writer has been making a study of the life cycle of members of the genus *Pleurocera*. The object of the present report is to give a brief description of the eggs and